CLAIMS

1. A method for production of three-dimensional bodies by successive fusing together of selected areas of a powder bed, which parts correspond to successive cross sections of the three-dimensional body, which method comprises the following method steps:
application of powder layers to a work table,
supplying energy from a radiation gun according to an operating scheme determined for the powder layer to said selected area within the powder layer,
fusing together that area of the powder layer selected according to said operating scheme for forming a cross section of said three-dimensional body,
a three-dimensional body being formed by successive fusing together of successively formed cross sections from successively applied powder layers,
characterized in that said selected area has two or more fusion zones which propagate simultaneously through the selected area when formation of a cross section of the three-dimensional body takes place.

2. The method as claimed in claim 1, characterized in that said two or more fusion zones are brought about by a radiation gun supplying energy to two or more geometrically separate focal points while time sampling takes place.

3. The method as claimed in claim 1 or 2, characterized in that the focal points of said radiation gun at said two fusion points propagate at a speed which corresponds to the wave propagation speed of the fusion zone.

4. The method as claimed in claim 3, characterized in that said wave propagation speed is estimated by measuring the wave propagation speed of the fusion zone from information provided by means for sensing the temperature distribution of a surface layer located in the powder bed.

5. The method as claimed in claim 3 or 4, characterized in that said wave propagation speed is estimated by calculating an energy balance for an area comprising said focal points, said wave propagation speed being obtained from a model of a thermal conductivity equation set up for said area.

6. The method as claimed in any one of claims 1-5, characterized in that an energy balance is calculated for at least one part area within each powder layer, it being determined in the calculation whether energy radiated into the part area from the surroundings of the part area is sufficient to maintain a defined working temperature of the part area.

7. The method as claimed in claim 6, characterized in that, in addition to said energy for fusing together the part area, energy for heating the part area is supplied if the result of the energy balance calculation is that sufficient energy for maintaining an intended working temperature of the part area is not present, a defined working temperature of the part area then being achieved.

8. The method as claimed in claim 6 or 7, characterized in that the energy balance for each powder layer is calculated according to $E^{in}(i) = E^{out}(i) + E^{heat}(i)$, where $E^{in}(i)$ represents energy fed into the part area, $E^{out}(i)$ represents energy losses through dissipation and radiation from the part area, and $E^{heat}(i)$ represents stored in the part area.

9. An arrangement for producing a three-dimensional product, which arrangement comprises a work table on which said three-dimensional product is to be built up, a powder dispenser which is arranged so as to distribute a thin layer of powder on the work table for forming a powder bed, a radiation gun for delivering energy to the powder, fusing together of the powder then taking place, means for guiding the beam emitted by the radiation gun over said powder bed for forming a cross section of said three-dimensional product by fusing together parts of said powder bed, and a control computer in which

information about successive cross sections of the three-dimensional product is stored, which cross sections build up the three-dimensional product, where the control computer is intended to control said means for guiding the radiation gun over the powder bed according to an operating scheme forming a cross section of said three-dimensional body, said three-dimensional product being formed by successive fusing together of successively formed cross sections from by the powder dispenser, characterized in that said operating scheme is arranged so as to guide the radiation gun to two or more fusion zones of said selected area, which fusion zones propagate simultaneously through the selected area when formation of a cross section of the three-dimensional body takes place.

10. The arrangement as claimed in claim 9, characterized in that said operating scheme is arranged so as, while time sampling takes place, to guide said radiation gun to two or more fusion zones for supplying energy to two geometrically separate focal points.

11. The arrangement as claimed in claim 9 or 10, characterized in that said operating scheme is arranged so as to guide the focal points of the radiation gun at said two fusion points at a propagation speed which corresponds to the wave propagation speed of the fusion zone.

12. The arrangement as claimed in claim 11, characterized in that the control computer is arranged so as to estimate said wave propagation speed by measuring the wave propagation speed of the fusion zone from information provided by means for sensing the temperature distribution of a surface layer located in the powder bed.

13. The arrangement as claimed in claim 11 or 12, characterized in that the control computer is arranged so as to estimate said wave propagation speed by calculating an energy balance for an area comprising said focal

points, said wave propagation speed being obtained from a model of a thermal conductivity equation set up for said area.

14. The arrangement as claimed in any one of claims 10-13, characterized in that the control computer is also arranged so as to calculate an energy balance for at least one part area within each powder layer, it being determined in the calculation whether energy radiated into the part area from the surroundings of the part area is sufficient to maintain a defined working temperature of the part area.

15. The arrangement as claimed in claim 14, characterized in that the control computer is arranged so as to control said operating scheme for supply of, in addition to said energy for fusing together powder layers, energy for heating the powder layer if the result of the energy balance calculation is that the operating scheme is not providing sufficient energy for maintaining an intended working temperature of the part area, a defined working temperature of the part area then being maintained.

16. The arrangement as claimed in claim 14 or 15, characterized in that the control computer is arranged so as to calculate the energy balance for each powder layer according to $E^{in}(i) = E^{out}(i) + E^{heat}(i)$, where $E^{in}(i)$ represents energy fed into the part area, $E^{out}(i)$ represents energy losses through dissipation and radiation from the part area, and $E^{heat}(i)$ represents energy stored in the part area.

17. The arrangement as claimed in any one of claims 10-16, characterized in that the arrangement also comprises means for sensing the temperature distribution of a surface layer located in the powder bed.